

Psychological Stress and Its Personality Correlates

Part II. The Rorschach Test and Other Personality Measures

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IN THIS ARTICLE we are reporting an attempt to predict performance under stress from a number of personality measures. Recently we presented an account of an experiment which dealt with the effects of stress upon performance on the Digit-Symbol Test (6). College students were subjected to a failure stress situation. A control and experimental group were administered an enlarged version of Form I of the Digit-Symbol Subtest of the Wechsler-Bellevue intelligence scale. The subjects were given the impression that this test was an excellent predictor of academic success. They were told that their scores would be entered on their college records.

Following Form I both groups were given the Group Rorschach Test. Upon completion of the Rorschach the control group were told that they had done very well on the intelligence test (Digit-Symbol), but that a readministration was necessary to obtain greater reliability of measurement. They were then administered Form II of the Digit-Symbol Test. During this second testing the experimenter called out false norms which were easy enough for all subjects to surpass.

The procedure for the experimental group was similar to that for the control. However, at the beginning of the retest they were informed that they had failed in the first testing and that they would be given one more chance. The false norms which were introduced during the second testing for this group were beyond the capacities of any subject.

The results of this experimental production of stress may be summarized as follows:

1 There was a significant increase in group variability as the degree of stress increased Under stress some subjects improved markedly in performance, while others showed a large impairment

2 Under stress an increase in the number of errors was found, which was compensated, to some extent, by an increase in speed Speed scores were found to account for 92 per cent of the variance of total performance

3 Students with high grade-point averages showed a tendency to improve their performance under stress Students with poor academic standing showed a decrement in performance As a group they were also more variable

Since one of the main findings of this study was that people vary greatly in their response to failure stress, an important question arises as to the personality correlates of these individual differences An initial approach to this question is to correlate various personality measures with *performance* under stress In the past, much attention has been given to correlating personality measures with nonperformance variables like indications of anxiety and subjective reactions to stress situations It is probable that these criteria of reactions to stress may produce very different kinds of results from actual performance under stress

The problem of the relationship between stress performance and personality measurement has been studied by a few previous investigators Some of them have obtained small but significant relationships using such variables as ascendancy and submission (9), and dominance feeling (8) Hutt (4) found that maladjusted children showed lower mental-age scores when the Stanford-Binet was administered under stressful procedures than they did when the administration was "supporting" Adjusted children showed no differences under the two types of administration

These relationships, although significant, have been rather small An exception to this is a study by Williams (10), who reported the unusually high multiple correlation coefficient of .824 between decrement in performance under stress and two Rorschach indices, the F+ per cent and the ratio of Sum C to total number of C responses

On the other hand, Adams (1) and Marquart (7) have obtained negative results in attempting to correlate personality variables with

stress performance. Both of these investigators used the Bernreuter Personality Inventory

Most of the experiments in this area have used personality variables which are related to emotional stability or personal adjustment. This reflects the widely held belief that performance under stress is basically related to adjustment, emotional control, or neuroticism. While in our first efforts we have gone along with this precedent, we no longer believe that this is the most fruitful procedure. The measures we used in the present correlational study were the Group Rorschach Test, the Guilford-Martin Inventory of Factors GAMIN, the Bell Adjustment Inventory, and a short personal interview.

The Rorschach records of eighty of the experimental subjects were scored by two clinical psychologists who were without knowledge of the subject's stress score.¹ The Klopfer and Kelley (5) scoring system was followed with the additional use of Beck's frequency tables for F+ and -, and his Z score. The following scoring categories were selected for correlation with the stress scores: R, W, Z, M, Total F-, FM + m, K + k, Fc, FC, CF + C, FC- (CF + C), F, F per cent, F + per cent, and Sum C/Total C. In addition the Buhler, Buhler, and Lefever (2) sign check list was used. Intercorrelations for all the Rorschach variables were also obtained.

Some months after the experiment we asked subjects who were in the upper and lower quartile in stress score to return for further testing and interviewing. At this time they were administered the Guilford-Martin Inventory of Factors GAMIN and the Bell Adjustment Inventory. They were also questioned concerning their previous stress experience. Unfortunately only twenty-two of these subjects could be reached because of the others' leaving school, or re-

¹ Each of the experimental subjects' stress scores was obtained by first subtracting his total performance score on the second test from his score on the first test. This difference score was highly correlated with the first test performance ($r = -.69$ for the controls and $-.49$ for the experimental subjects). To correct for this correlation we determined the deviation of each of the difference scores from the value that would be predicted from the first test score. The data from the control group were used in obtaining the prediction equation. The result is a stress score which has been corrected for the first test performance and for which positive values indicate improved performance under stress and negative values represent a decrement.

fusal to come Ten of these subjects were in the high stress score group (those whose performance improved under stress)

In order to determine the degree of relationship between the personality measures and stress score the Pearson Product Moment r was used Scatter diagrams were constructed for all of the relationships and inspection of these diagrams offered no evidence of curvilinearity for any of them However, in the case of several of the Rorschach scores there was a marked skewing of the distributions, the scores tending to pile up at the zero end of the distribution In such cases the significance of the relationship was computed by a fourfold Chi square test in addition to the Pearsonian r In no case was a significant Chi square obtained where the r was not also significant.

RESULTS

The most important data in this study are concerned with the ability of various Rorschach measures and signs to predict an individual's performance under stress In Table I we have presented the correlations which we obtained between stress score and the various Rorschach measures As you will note, in no case do the correlations even approach significance

TABLE I
CORRELATIONS BETWEEN RORSCHACH VARIABLES AND STRESS PERFORMANCE*

Rorschach Variable	r^*	Rorschach Variable	r^*
F—	— 01	K+k	— 02
Total minus	— 03	Fc	— 06
Total R	01	FC	— 07
M	— 06	CF+C	— 19
W	— 03	FC—(CF+C)	04
F	07	Rorschach check list	04
Z	— 10	Sum C Total C	— 03
FM+m	07	F+%	04

*N is equal to 80 in all cases. For significance at the .05 and the .01 level r must equal $\pm .22$ and $\pm .28$ respectively

As a prelude to correlating the Rorschach variables with stress score, intercorrelations among these variables were computed These intercorrelations may be found in Table II The reader who is familiar with Wittenborn's (11) data on Rorschach intercorrelations will note a number of marked discrepancies between his and

our data. Whether these differences are due to sampling, differences in scoring, differences between individual and group administration, or other factors, is not clear.

TABLE II
INTERCORRELATIONS AMONG THE VARIOUS RORSCHACH SCORING CATEGORIES
N EQUALS 80 IN ALL INSTANCES*

	1	2	3	4	5	6	7	8	9	10	11	12
1 R		29	22	32	- 16	08	16	22	- 26	04	79	- 19
2 Total minus			- 07	16	- 18	17	11	12	- 09	- 06	29	01
3 M				30	13	11	02	- 25	36	19	- 11	16
4 FM+m					- 04	11	03	01	- 02	00	08	- 14
5 CF+C						07	- 57	08	34	09	- 16	23
6 FC							86	12	10	39	- 17	04
7 FC-(CF+C)								04	- 10	27	- 06	- 05
8 K+k									- 02	23	18	04
9 Z										21	- 42	82
10 Fc											- 25	21
11 Total F												- 33
12 W												

*For significance at the .05 and the .01 level of confidence r must equal $\pm .22$ and $\pm .28$ respectively.

In addition to the Rorschach data we found that scores on the Guilford-Martin Inventory of Factors GAMIN and the Bell Adjustment Inventory failed to differentiate between the high and low stress groups. In no case were statistically reliable differences obtained. However, there was a tendency for the group who showed improvement under stress to be more ascendant on both the Bell and the Guilford-Martin. They also showed more emotional stability on the Bell and greater self-confidence on the Guilford-Martin. Perhaps with a larger number of cases these differences would have attained statistical significance.

The twenty-two subjects who were given the Guilford-Martin and the Bell were also given a short personal interview. The purpose of this interview was to obtain subjective information about the subject's past *performance* in nonexperimental stress situations. We also wanted to get his impressions about how calm or upset he usually felt under stressful conditions.

In Table III a comparison is made between the two groups in terms of whether they believe that their performance tends to improve or to be impaired under stress. Despite the small number of cases, a reliable difference between the two groups was found. The

Chi square is significant beyond the .02 level of confidence.² Of the 10 subjects who showed an actual improvement in performance under our experimental stress conditions, 8 of them stated that, on the basis of past experience, they believed that they would perform better under stress. Of the 12 subjects showing impaired performance under stress, 10 of them predicted this on the basis of their previous experience.³

TABLE III

THE ABILITY OF SUBJECTS IN THE HIGH AND LOW STRESS SCORE GROUPS TO PREDICT THEIR PERFORMANCE UNDER STRESS*

GROUP	PERFORMANCE PREDICTION	
	Improved	Impaired
High stress score	8	2
Low stress score	2	10

* $\chi^2 = 6.45$ $P < .02$

In addition to being asked his past reactions to stress, each subject who was interviewed was also questioned about his tendency to be a calm or easily upset individual. These statements were then compared with actual performance under stress. Table IV presents the Chi square analysis of this comparison. While the findings are

TABLE IV

COMPARISON OF THE HIGH AND LOW STRESS SCORE GROUPS IN TERMS OF WHETHER THE INDIVIDUALS COMPRISING THEM CHARACTERIZE THEMSELVES AS CALM OR UPSET UNDER STRESS*

Group	Calm	Upset
High stress score	5	5
Low stress score	11	1

* $\chi^2 = 2.90$ $P < .10$

² Yates's correction for fourfold tables has been applied to all Chi square computations.

³ It is unlikely that subjects could have used their experience with the experiment as a cue to their performance under stress. At the time they were asked about their guess, they did not know what their score had been. Moreover, it was explained that complicated statistics were necessary to obtain their stress score. The use of the regression equation to correct for the relationship between first test score and difference score would ruin any subject's guess which was based on remembering the number of items he completed during the first and second testing.

not statistically significant, there is a tendency for those subjects who characterized themselves as calm to show impairment of performance under stress. In any case, performing badly under stressful conditions is not positively associated with the tendency to characterize oneself as easily upset under those conditions.

DISCUSSION

As we have said before, the outstanding feature of this study is the lack of relationship obtained between performance under stress and any of the Rorschach variables we used. This shows that the Rorschach test used in this way is not a valid instrument for predicting performance under this type of stress. Its inappropriateness applies not only to the individual scoring categories, but also to the Buhler, Buhler, and Lefever sign check list. While the experiment was not intended as a validity study of the Rorschach test, it is important to know the limitations of the instrument with respect to its usefulness in predicting performance under stress. We believe that since the individual scoring categories showed no tendency to correlation with stress performance, any other way of using the Group Rorschach in a more global sense would not succeed either.

Despite the fact that Williams (10) obtained high relationships using the ratio of the sum of C to the total number of C, and the F+ per cent, our correlations for these variables were negligible. In our data, F+ per cent correlated .04 with stress scores, and Sum C to Total C correlated -.03. The discrepancy between our study and Williams's study might be accounted for in terms of sampling variability (Williams used an *N* of 25) or difference in the type of stress situation. The data in the present experiment are actually supported by the findings of Deese and Lazarus (3), who, in a different experiment, using a different task and air force enlistees as subjects, obtained similarly negative findings in regard to the Rorschach Test as a predictor.

It is not altogether surprising that little or no relationship is found between Rorschach variables and stress performance. In fact, we would be somewhat surprised if any single personality measure produced a relationship with stress performance which was high enough to be practical. When one carefully analyzes the possible bases of performance under stress, the complexity of the problem

of prediction becomes apparent. People can perform similarly under stress for a variety of different reasons. While in some instances anxiety or emotional disruption can account for the impairment in performance, it is very unlikely that this is the only important variable involved.

For example, giving subjects false information that they are failing may cause some of them to alter their mode of attack on the problem. Depending upon their original approach, this change of procedure could produce either impairment or improvement. Moreover, some subjects may do poorly because of the need to protect their self-esteem against failure. Such subjects are sometimes said to leave the field psychologically. They protect themselves against failure by not competing. In this case, psychologically they are not failing at all. This mechanism is apt to result in a reduction in effort and thus a reduction in score.

The conclusion from the above analysis is that we cannot expect any single personality variable such as a Rorschach category or an adjustment score to correlate well with performance under stress. The prediction of performance under stress requires tools that will measure all the pertinent variables (motives, emotional control, mode of attack, etc.) in any stress situation, and the use of these measures in multiple regression. The first step is actually to identify what the relevant variables may be. As we have pointed out earlier, most of the previous research has dealt with single personality variables and has tended to ignore the interactions between individuals and situations and the multiplicity of relevant variables. For this reason the very high relationships found by Williams are most surprising.

With respect to the results from the pencil and paper tests, our findings are inconclusive because of the very small number of cases. While no significant relationships with stress performance were found on the Bell and the Guilford-Martin, the tendency for ascendant subjects to do well under stress is in agreement with the findings of Taylor and Farber (9) and Meadow (8).

The data obtained from the personal interview had several interesting implications. In the first place the fact that those who showed a decrement under stress tended to characterize themselves as calm persons, and that more of the subjects who did well in per-

formance under stress described themselves as easily upset, is the opposite of what one might have expected. This finding is partly supported by another study (3) which also demonstrated that subjects who are rated as overtly disturbed in stress situations need not be those who show impaired performance. The full implication of this fact has not previously been recognized by psychologists interested in psychological stress. For example, the psychiatric screening of military personnel has, in the past, greatly depended upon such signs of emotional upset as tremor, excessive sweating, and other anxiety indicators. It is possible that these criteria are inappropriate or less important than supposed should further work substantiate the lack of positive relationship between outward signs of disturbance and impaired performance under stress conditions.

Finally, we may note that our subjects were able to predict the direction of the change in their performance under stress. Assuming that this finding has generality, we are left with the amusing conclusion that, with our present techniques, the best way to predict how a man will perform under stress is to ask him.

SUMMARY

The study which has been reported above was a follow-up on a previously reported experiment which investigated the effects of failure stress upon performance on the Digit-Symbol Test. The present report presents an attempt to predict performance under stress from various personality measures. No relationships were found between performance under stress from various personality measures. No relationships were found between performance under stress and any Rorschach variable. Some nonsignificant trends were found on the Guilford-Martin Inventory of Factors G.A.M.I.N. and the Bell Adjustment Inventory indicating that subjects who improve in performance under stress are more ascendant and have greater self-confidence.

Subjects characterizing themselves as calm were more apt to show poor performance under stress than those reporting that they were easily upset under stressful conditions. Moreover, subjects could predict whether or not they would improve or show impairment in performance under stress.

Some theoretical comments were also made concerning the general problem of predicting performance under psychological stress

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